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March 26, 2002

By Electronic Filing

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
445 12th St., N.W.
Washington, D.C. 20554

*Re: Ex Parte Submission
Establishment of Rules and Policies for Satellite Digital Audio Radio
Service in the 2310-2360 MHz Band, IB Docket No. 95-91*

Dear Mr. Caton:

BellSouth Corporation ("BellSouth") hereby responds to a letter submitted March 18, 2002, by XM Radio, Inc. ("XM") and Sirius Satellite Radio, Inc. ("Sirius"). In the main, that letter contains no new information or analyses. Rather, it relies on an erroneous and oft-repeated contention that high-power SDARS terrestrial repeaters will not cause brute force overload to WCS customer premises equipment ("WCS CPE") or, if they do, WCS licensees can use RF Automatic Gain Control ("RF AGC") in WCS CPE to mitigate this problem.

BellSouth and the other WCS licensees have shown repeatedly that RF AGC (or even RF AGC plus the use of filters) in WCS CPE will not solve the interference problems caused by high-power SDARS terrestrial repeaters. Specifically, in November 2001 BeamReach Networks, Inc., BellSouth Corporation, Verizon Wireless, Inc. and WorldCom, Inc. submitted a document entitled: "Response to XM Radio's Supplement to August 29, 2001 White Paper" ("Response").¹

The Response demonstrated that WCS equipment manufactured by BeamReach—an experienced and well-known manufacturer—already includes front-end RF AGC in its

¹ Letter from Randall Schwartz, *et al.*, to Magalie Roman Salas, IB Docket 95-91 (Nov. 2, 2001).

state-of-the-art WCS CPE. It demonstrated further that RF AGC alone cannot protect WCS CPE against blanketing interference caused by high-power SDARS terrestrial repeaters because the difference in power levels between SDARS repeaters and WCS base stations is too great for WCS CPE to differentiate. The Response also contained a detailed explanation of the methodology employed in the WCS Coalition's analysis and included several graphical depictions of the geographic impact that interference would have on WCS licensees' markets. Neither XM nor Sirius has produced any analysis undermining the Response.

More recently, BeamReach responded to XM and Sirius' March 18, 2002 letter and provided additional information confirming that RF AGC will not solve the brute force overload problem in WCS CPE caused by SDARS repeaters.² While it acknowledges that it can design an RF AGC circuit to adequately attenuate an SDARS signal so that it will not cause brute force overload, BeamReach explains that such an RF AGC circuit will reduce the WCS signal—a signal expressly limited by Commission rule to 2 kW—to such a negligible level that WCS CPE will not be able to receive it.³

Similarly, adding filters to RF AGC in WCS CPE will not economically eliminate interference caused by high-power SDARS repeaters. In May 2001, BeamReach provided a filter cost analysis that demonstrated that an effective WCS filter would add about \$1,500 to the price of CPE, would be 8" by 6" by 2" and would weigh about 3 pounds. This effectively renders the SDARS idea a non-starter because the cost of the WCS CPE needs to be in the \$200-300 range at the most.⁴

BeamReach's March 22nd letter also demonstrates that neither BeamReach nor any other manufacturer is able to deliver a filter that will economically eliminate SDARS-caused interference at WCS CPE. This includes state-of-the-art alumina filters. According to BeamReach, it was quoted a price of up to \$2,000 for a filter to eliminate the brute force overload to the C and D bands from SDARS repeaters operating at 40 kW.⁵

While XM and Sirius would like the Commission to believe that there is a simple, cost effective solution to the interference problem they will create, their actions belie that result. Neither XM nor Sirius is willing to reimburse the WCS licensees or their WCS customers for the costs of adding RF AGC and filters to WCS CPE. This is because they know the costs will exist and will be significant.

² Letter from Randall Schwartz to William F. Caton, IB Docket No. (March 22, 2002).

³ *Id.*, p. 2

⁴ Letter from Randall Schwartz to Magalie Roman Salas, IB Docket No. 95-91 (May 30, 2001), p. 6.

⁵ Letter from Randall Schwartz to Magalie Roman Salas, IB Docket No. 95-91 (March 22, 2002), p. 2.

In light of the detailed BeamReach technical analyses and cost data, XM and Sirius bear the burden of proving that there is an economic and practical cure for brute force overload at WCS CPE. XM's and Sirius' recent attempt⁶ to refute the WCS Coalition's November 2001 showing simply fails on this point.

Conversely, in its calculations and demonstrations, BeamReach used measurable performance specifications (*e.g.*, receiver sensitivity values) actually achieved by its WCS equipment. Rather than use this data, XM and Sirius chose to adopt alternative values for these performance specifications. For example, the record reflects the fact that XM and Sirius employed a WCS receiver sensitivity specification of -101 dBm⁷ even though past WCS Coalition filings clearly indicate that the sensitivity of actual WCS CPE equipment is -80 dBm.⁸ XM and Sirius do not explain or justify their departures from the measured specifications. By altering these values, XM and Sirius arrive at a false 21 dB link margin and, as one would expect, they generate a false conclusion.

Unable to produce a valid technical analysis to support their erroneous RF AGC claim, XM and Sirius repeat previous contentions that:

- mere differences in power levels between satellite DARS terrestrial repeaters and WCS base stations do not foreclose the possibility of the two services operating in adjacent spectrum, and
- SDARS licensees successfully use RF AGC to mitigate interference from each other's high-power repeaters, and BellSouth does not explain why this cannot be used successfully for WCS.

Rather than proving their case, the first bullet point emphasizes the fact that one must analyze the problem of interference at both base stations and CPE. BellSouth has acknowledged, and does so again here, that the differences in power levels between SDARS and WCS base stations can be resolved adequately at base stations through the use of cost-effective filters and that this factor does not preclude these services from coexisting. This is true because the economics of WCS base stations are different than the economics of WCS CPE. Filters placed at base stations are costly, but those costs are spread over numerous subscribers. Also, because size is less of an issue at base stations, the net negative impact of larger, more expensive base station filters is more tolerable financially.

⁶ Letter from Bruce D. Jacobs to William F. Caton, IB Docket No. 95-91 (March 5, 2002).

⁷ *Id.*, Attachment at 8.

⁸ Response at 4.

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In contrast, filters for WCS CPE directly increase the incremental cost for every single WCS subscriber. And because space at customer premises is unquestionably a critical consideration, such filters must be small. This requirement raises the cost of filters and reduces their effectiveness. These factors, among others, make WCS CPE filters impractical to cure brute force overload caused by high-power SDARS terrestrial repeaters.

As XM and Sirius know from their own experience with CPE, a service can be rendered unusable if its CPE cannot receive a clear signal from the base station or if it cannot differentiate the desired signal from other, more powerful signals (*i.e.*, brute force overload.) Evidence supplied by BellSouth, the WCS Coalition and BeamReach clearly shows that the differences in power levels between SDARS repeaters and WCS CPE cannot be resolved through the use of RF AGC or RF AGC plus filters at WCS CPE.

XM's and Sirius's second contention is inadequate to refute the factual showings made by the WCS Coalition that RF AGC will not work with respect to SDARS to WCS CPE interference. Contrary to their assertion, the problem is not just the power levels at which SDARS repeaters operate. Rather, it also is the disparity between the high power levels of SDARS repeaters and the much lower power levels at which WCS equipment is authorized to operate.

Accordingly, the SDARS licensees' ability to coexist is explained, at least in part, by the fact that they both have engineered their terrestrial networks to achieve very similar power flux density levels in the major urban areas where they have deployed their repeaters.⁹ This approach limits the signal level variations between desired and undesired signals in the receiver and creates an environment in which they can employ RF AGC as an effective strategy.

Moreover, XM and Sirius have admitted in conversations that they have specially coordinated their repeater deployment with each other to avoid problems between themselves, though no similar effort was made with respect to WCS licensees. In any event, BellSouth and the WCS Coalition have demonstrated that none of the proposals offered by XM and Sirius works for WCS CPE.

Beyond power coordination and RF AGC, neither XM nor Sirius has provided details about how they may have solved brute force overload at their CPE. Without such information, the Commission and the WCS licensees cannot evaluate their alleged

⁹ Letter from Bruce D. Jacobs to Magalie Roman Salas, IB Docket No. 95-91 (April 30, 2001), p. 1.

“solution” to determine whether and at what cost the solution might be applied to WCS equipment. In other words, the Commission has no information upon which to base a conclusion that, because RF AGC eliminates SDARS to SDARS interference, it will economically and effectively eliminate SDARS-to-WCS CPE interference where the differences in power levels are significantly greater.

In addition, should SDARS licensees provide such information and should BellSouth conclude that such solutions are effective and economic, the Commission should obligate the SDARS licensees to reimburse the WCS licensees for any additional costs they incur as a result of the need to implement such a “solution.” XM and Sirius claim the right to engineer their network and equipment in a manner they deem efficient to their own needs. Significantly, they have presented no basis for denying the WCS licensees that same right.

The only reason for WCS licensees to incur the costs of XM’s and Sirius’ proposed “solution” is to mitigate the harm created by the unilateral and self-optimizing engineering choices of XM and Sirius. As the parties imposing the burden on WCS licensees and denying WCS licensees the same opportunity to self-optimize their networks, the SDARS licensees should be the parties to bear the cost.

By way of summary, BellSouth and others have submitted analyses showing that RF AGC or RF AGC plus filters will not eliminate brute force overload at WCS CPE. And, XM and Sirius have failed to provide credible technical analysis, data, or valid arguments to rebut those showings.

Nor have XM and Sirius shown why they must operate at power levels above 2 kW in light of their admission that their receivers will work at -77 dBm levels.¹⁰ Before the Commission promulgates rules permitting SDARS licensees to operate terrestrial repeaters at power levels above 2 kW, it should require XM and Sirius to demonstrate precisely why they believe such power levels are necessary from a technical perspective. If they cannot, then one may be led to conclude that XM and Sirius have engineered their networks in a way to deliberately shift costs to other spectrum neighbors that they themselves are unwilling to bear.

BellSouth wishes to address three other failed arguments from XM and Sirius. First, they state that a 2 kW EIRP SDARS repeater network will cause *more* interference than a 40 kW EIRP repeater network. At a minimum, the Commission should view this argument with suspicion. Every WCS licensee participating in this proceeding wholeheartedly and repeatedly has rejected it. Neither XM nor Sirius has suggested any WCS agenda other than the WCS licensees’ real concern over debilitating interference.

¹⁰ *Id.*

Moreover, under the SDARS' licensees' theory, their assertion cannot be correct. If RF AGC and filtering will work at WCS CPE to mitigate interference from terrestrial repeaters operating at 40 kW, it is axiomatic they will work even better to mitigate interference from 2 kW repeaters.

RF AGC and filtering are intended to allow WCS CPE to differentiate between a desired signal and an interfering signal. Where the power difference between SDARS and WCS by definition must be less than 2 kW, rather than up to 38 kW, it simply is easier and less expensive to develop effective and economic RF AGC and filters. Thus, under the SDARS' theory the financial impact on WCS customers from SDARS operating at 2 kW will be less than at 40 kW.

In addition, omni-directional 40 kW repeaters blast their signals across a large geographic area creating an exclusion zone for WCS licensees whether or not its purpose is to function as a gap-filler. By using 2 kW repeaters, XM and Sirius can focus coverage on just those urban canyons and other trouble areas where they need repeaters. This will leave WCS CPE unaffected by SDARS interference in many areas. Even where they use sectorized antennas, the higher power levels may cover geographic areas that are not needed for pure gap filling.

Second, XM and Sirius claim that BellSouth failed to support its contention that, if SDARS repeaters were capped at 9 kW, debilitating interference would still extend 4-5 miles from those repeaters.¹¹ The Response (referenced above) demonstrated that SDARS terrestrial repeaters operating at 40 kW will cause blanketing interference to WCS CPE located *eight miles* away even using RF AGC as proposed by XM and Sirius. That filing included a thorough explanation of the methodology used to derive the numbers for 40 kW repeaters. BellSouth used this same methodology to calculate the interference area of 4-5 miles for 9 kW repeaters.

Third, XM claims that it has done "significant representative testing" of WCS-type equipment without evidence of interference. This assertion is self-serving and without basis in the record. XM has failed to submit complete details about such testing to the Commission or WCS licensees for analysis. Significant questions remain unanswered including what was the test's duration; what locations were tested; what power levels and what power level differences were tested; what equipment was tested; and, most important,

¹¹ Letter from Karen B. Possner to William F. Caton, IB Docket No. 95-91 (March 11, 2002).

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what were the specific results of each test? Other questions include: was the terrain tested typical of the urban canyons where gap fillers may be needed; how much coordination was required to reach "acceptable" results; were buildings or terrain used to screen out the interference; were DARS repeaters pointed towards or away from the CPE; or, was the CPE turned away from the SDARS repeaters? Without this information, neither BellSouth nor the Commission can conclude the testing was "significant," "representative" or produced the results that XM and Sirius claim it produced. Accordingly, the Commission can draw no conclusions from their bald assertion.

Indeed, XM's unsupported assertion regarding "significant representative testing" typifies XM's and Sirius' submissions in this proceeding. When faced with factual submissions from BeamReach and the WCS Coalition, they respond with unsupported theory and make arbitrary changes to actual technical data provided by BeamReach and the WCS Coalition. They also attempt to shift the blame to WCS licensees by making unsupported charges about WCS networks and equipment. Or they ask the Commission to shift the costs of mitigating interference they cause to WCS customers through higher CPE costs or higher engineering and operational costs.

The Commission should rely on the facts in the record. SDARS repeaters operating above 2 kW will create unacceptable interference for WCS CPE in larger geographic areas than will repeaters operating at 2 kW or less. Neither RF AGC nor RF AGC plus filtering at WCS CPE can effectively and economically mitigate such harmful interference. The impact of that SDARS interference on WCS customer equipment will be debilitating.

Against these facts, neither XM nor Sirius has justified the need to operate their terrestrial repeaters at power levels greater than 2 kW given their concession that their receivers will work well at -77 dBm. Accordingly, the Commission should limit SDARS terrestrial repeaters to 2 kW and permit a brief transition period within which the SDARS licensees must conform to that standard.

Please refer any questions regarding this matter to the undersigned.

Sincerely,

A handwritten signature in blue ink, appearing to read "William F. Caton", with a long horizontal line extending to the right.

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cc: Donald Abelson
Thomas Sugrue
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